GeoGebra Exam Stick

1 November 2018

Introduction

The GeoGebra Exam Stick is a full operating system containing GeoGebra to be used in an exam environment. It has the following benefits:

- It can be used on laptops or desktops without modifying the content of the computer.
- It fits on a normal sized USB stick since the full size is 1.4 GB.
- It contains the latest GeoGebra version available at the time of creating the ISO. (Both GeoGebra 5 and GeoGebra 6 Classic are included.)
- The USB contains detailed documentation on using GeoGebra as well.
- The student's work is saved to a folder which is invisible for other students, thus it is impossible to cheat during the exam by interchanging data electronically.
- The student's work is retrievable later by the teacher on another machine. The work can be identified by a folder according to the date of examination.
- The USB stick is generated by a free set of software tools, including Debian Live. This assures the long term availability and continuous improvement of GeoGebra Exam Stick.

The USB stick is a result of a joint work of several universities, colleges and high schools worldwide, including

- University of Applied Sciences and Arts, Northwestern Switzerland, FHNW
- Johannes Kepler University Linz, Austria, JKU

How to use it

Preparation of the GeoGebra Stick

1. Download and install VirtualBox (free) from https://www.virtualbox.org/wiki/Downloads. Also download and install VirtualBox Extension Pack.
2. Download GeoGebra Exam Stick from http://download.geogebra.org/geogebrastick/:
   a. geogebra-stick.iso - GeoGebra including all goodies
   b. geogebra-stick-no_cas.iso - GeoGebra without CAS view
   c. geogebra-stick-no_3D.iso - GeoGebra without 3D view
   d. geogebra-stick-no_cas-no_3D.iso - GeoGebra without CAS and 3D view
3. Create a virtual machine in VirtualBox and mount the GeoGebra Exam Stick.
4. Start the operating system by booting the system from the mounted drive.
5. Clone the operating system to one or more pendrives.

Use during Exams

1. Share the pendrives among the students.

2. Boot the pendrive on each student computer.
3. Students should solve the exam exercises. When then they are finished with the solving or the time is over, the computer should be shut down and the pendrives must be collected by the teacher.

Evaluation

1. The teacher can read the content of the pendrive on her own machine.
2. The sticks can be re-used any time in another examinations without any further changes.

Detailed help in screenshots

Preparation of the GeoGebra Stick

1. Download and install VirtualBox...

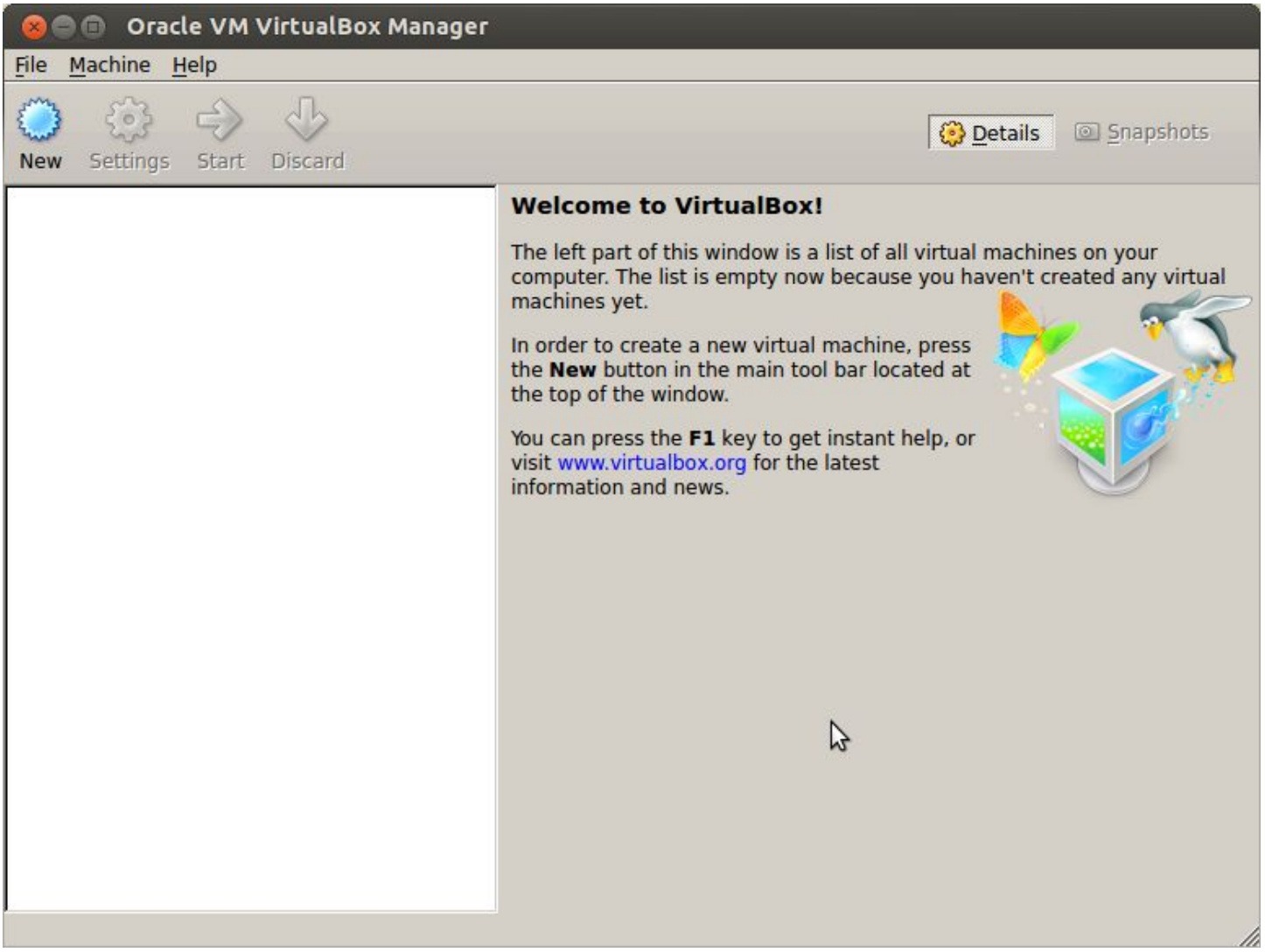
Please take the time to install both *VirtualBox* and then *VirtualBox Extension Pack* properly. On some operating systems you may need additional steps to make the extension pack work correctly, otherwise you will not be able to access the USB device and create the stick in Step 5.

Example on Ubuntu Linux (all versions from 12.04 until 18.04)

- Install VirtualBox by issuing the command **apt-get install virtualbox**.
- Check its version number and search for the download folder of that version. For example, on Ubuntu 18.04 the correct folder is http://download.virtualbox.org/virtualbox/5.2.10. Download the latest file with the extension .vbox-extpack.
- Double-click on the downloaded file in a file manager and let VirtualBox install the extension pack.
- Issue the following command: **sudo usermod -aG vboxusers *your_name*** where *your_name* stands for your user name.
- Reboot your machine.

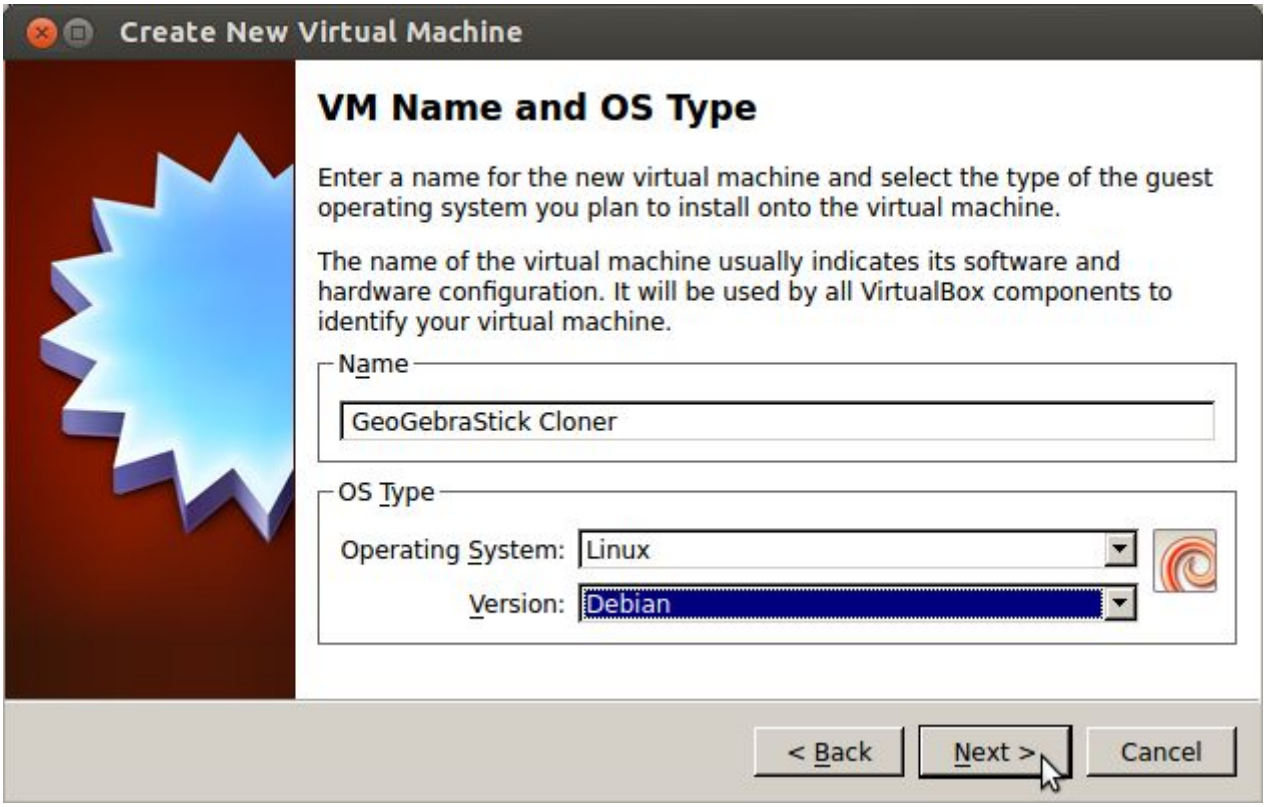
3. Create a virtual machine...

Start VirtualBox. *Note: The following screenshots were taken on a Linux version of VirtualBox thus they may differ a little bit from the look of your actual installation.*

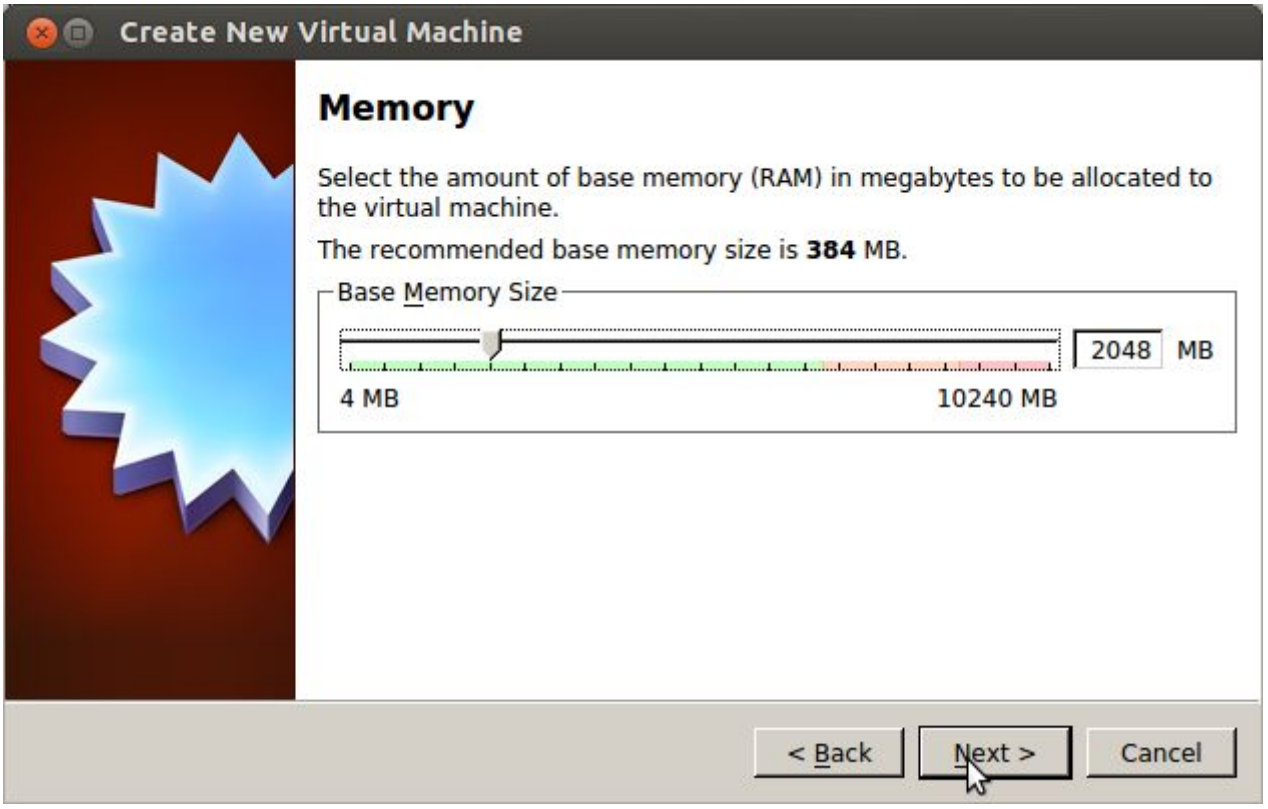


Click on **New**, then on **Next**.

Fill in the form as follows.



Now click **Next** and set **Base Memory Size**. At least 1024 MB is recommended for older versions of GeoGebraStick, and at least 2048 MB is recommended for recent versions (however, VirtualBox suggests using 384 MB at least). Then click on **Next**.

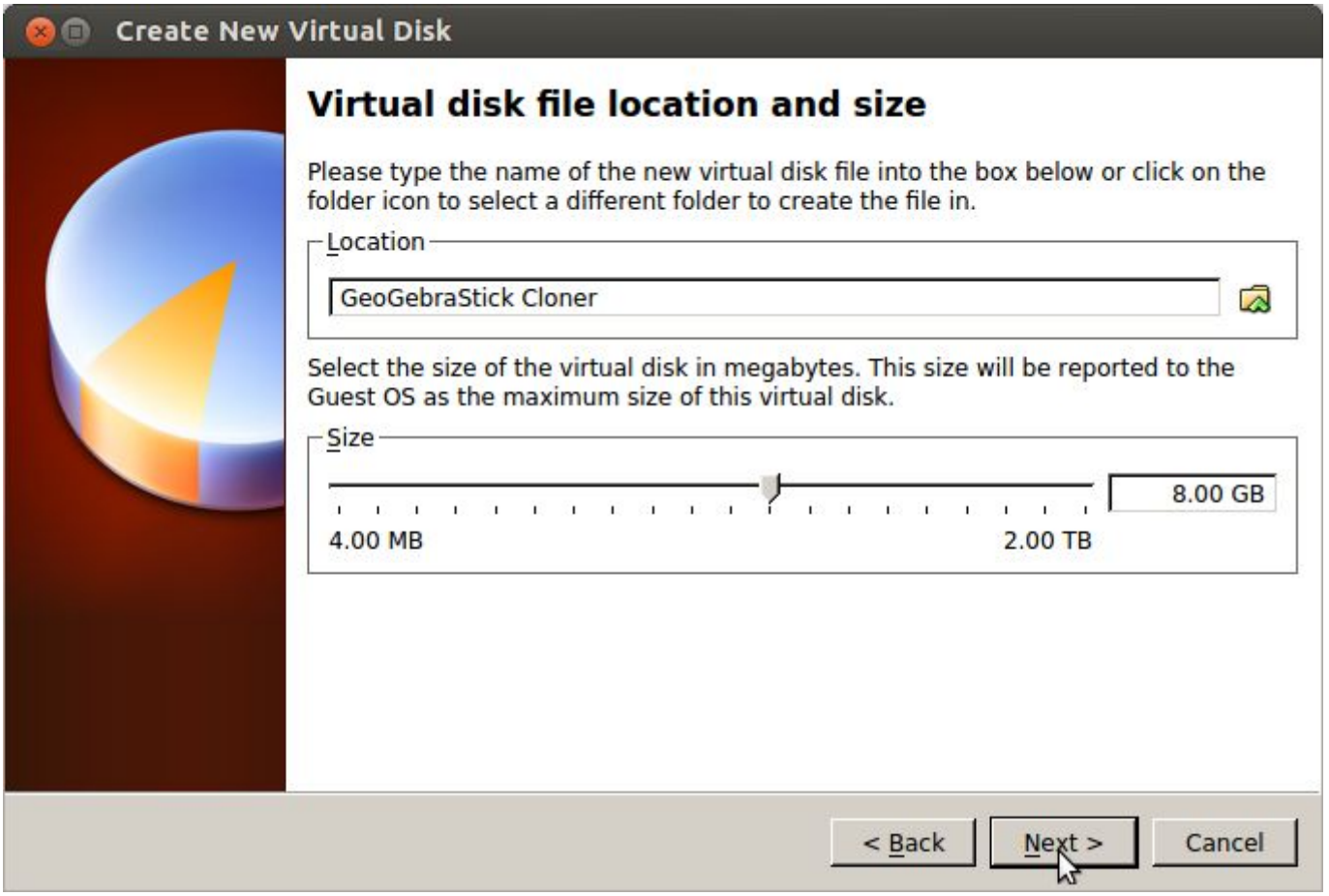


Now leave settings for the Virtual Hard Disk as they are and click **Next** again.

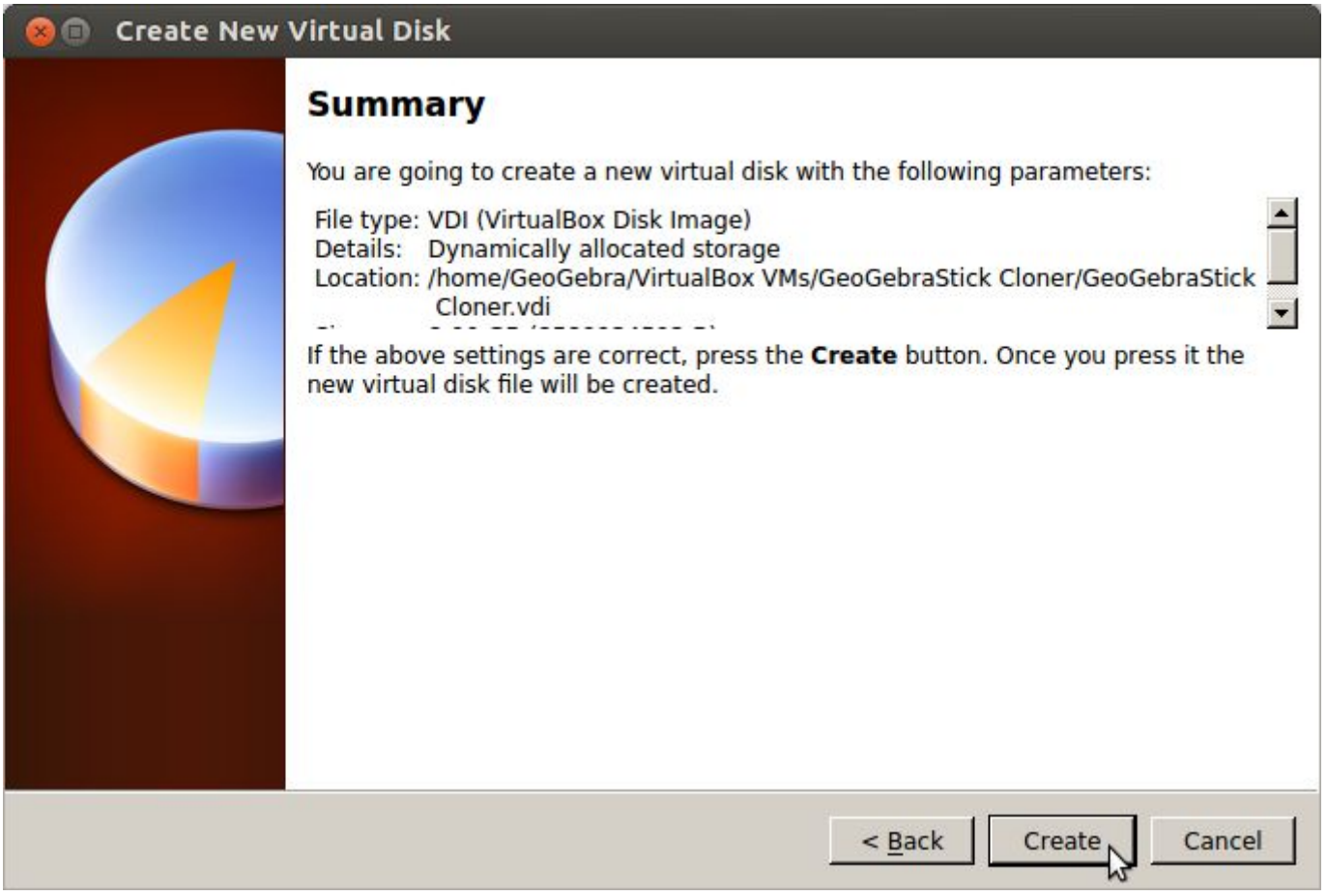
Use the default settings at the next screen again and click on **Next**.

Do the same at the next sceen as well.

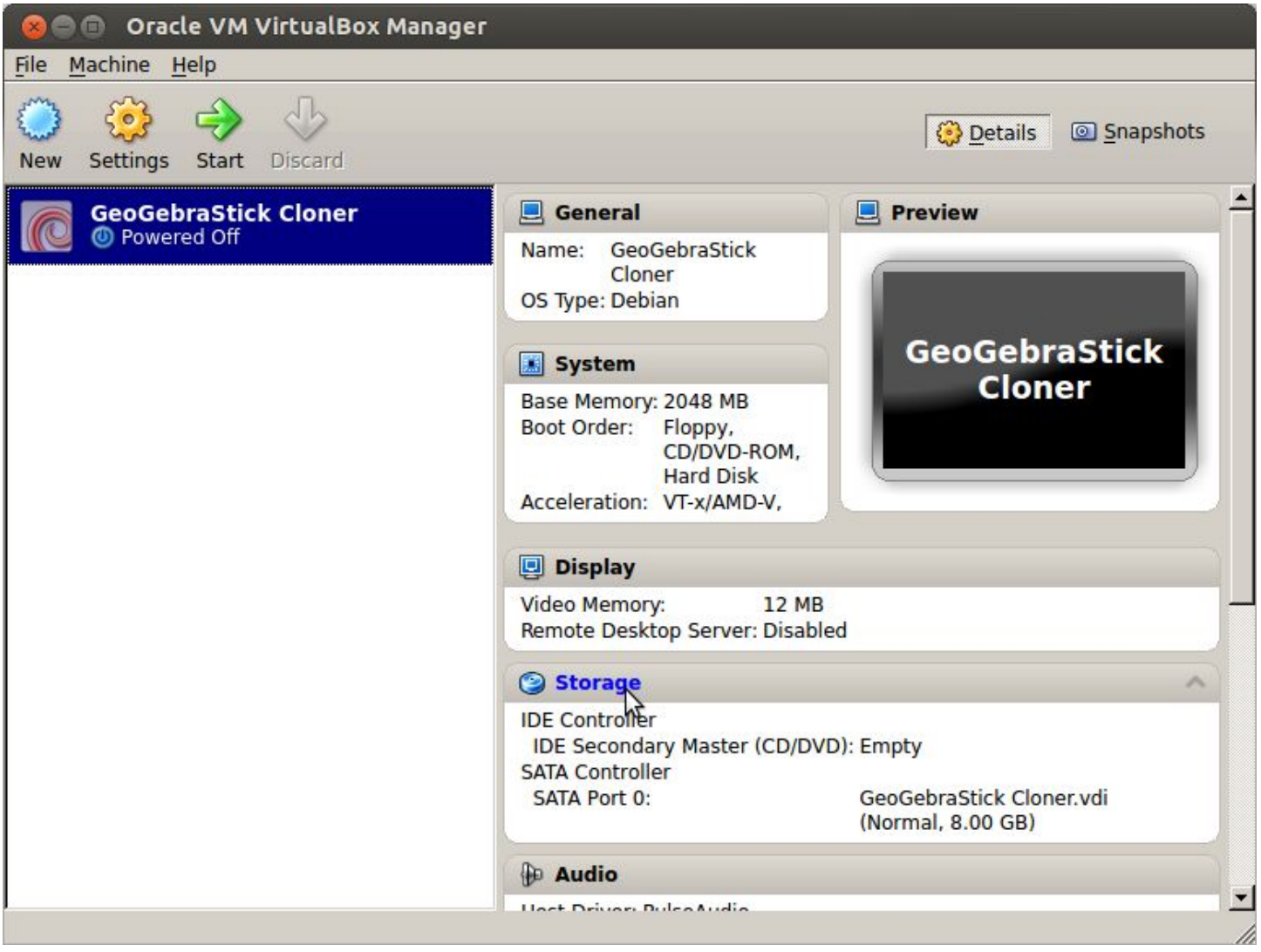
Again, do the same.



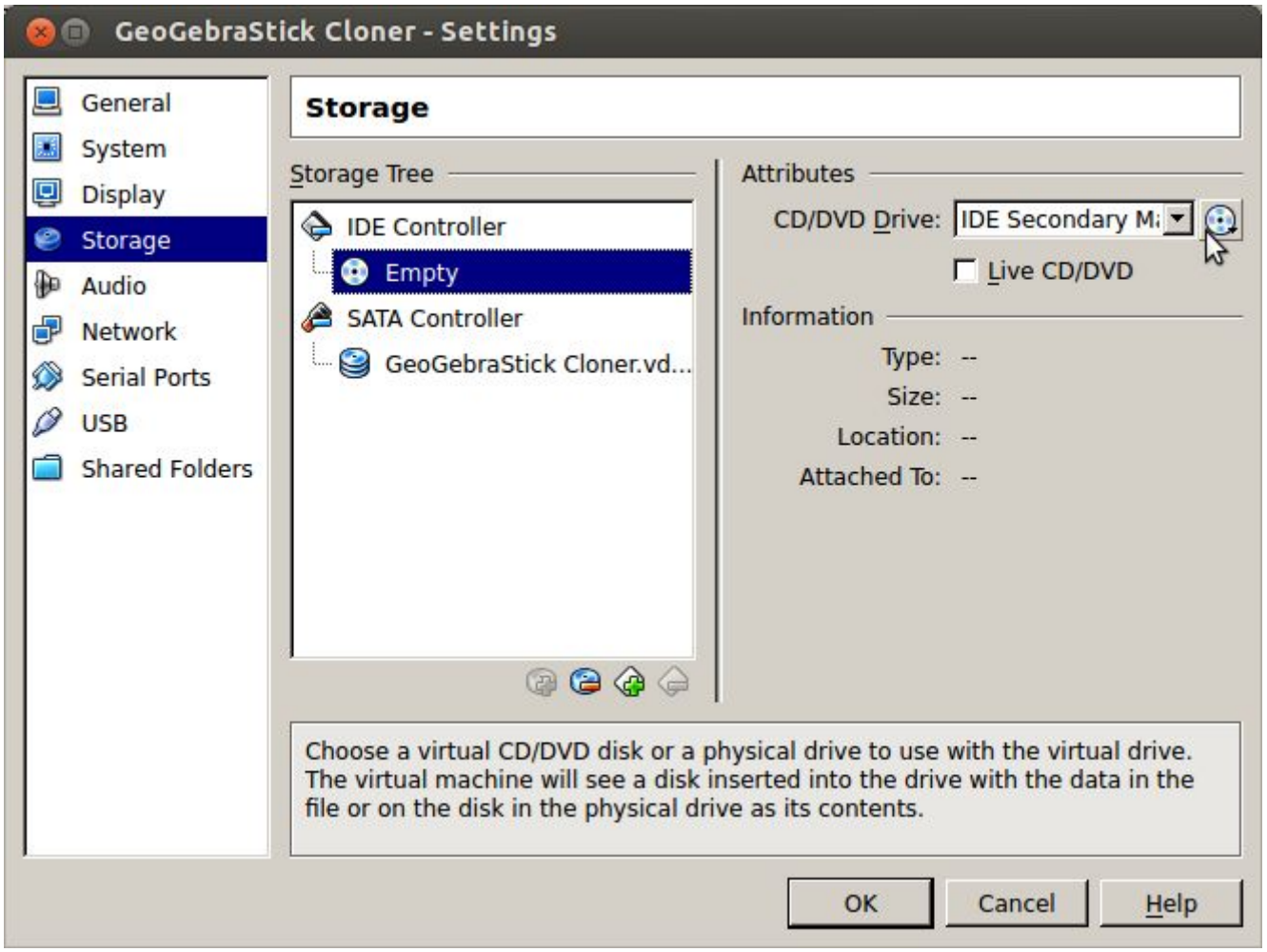
Finally you get the last screen and you must choose **Create** (twice, since the Summary will be shown again, not shown in this tutorial).



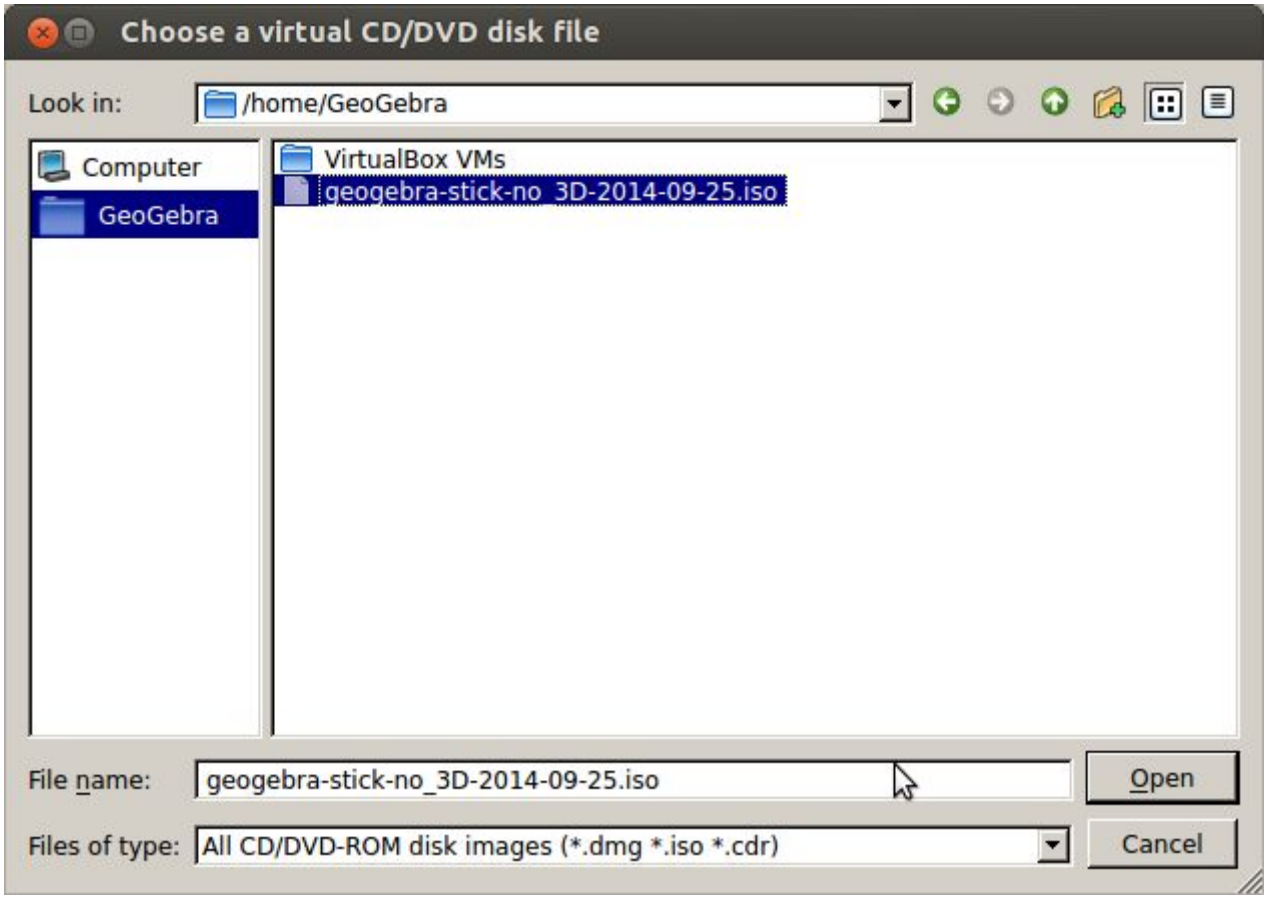
Now you will see the freshly created virtual machine in the VirtualBox window.



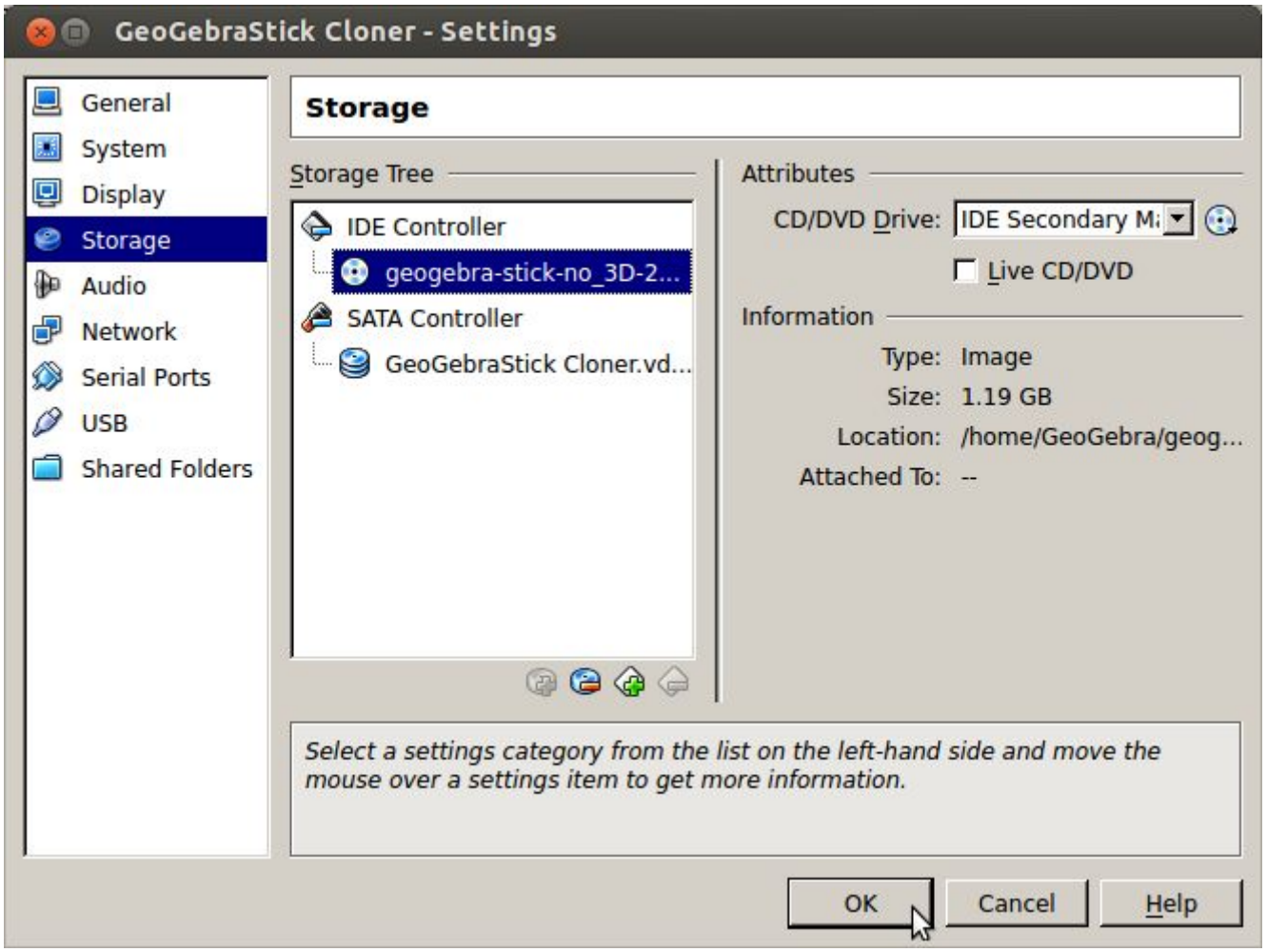
Click on **Storage** to add the downloaded GeoGebra Exam Stick .iso by choosing **Storage Tree** > **IDE Controller** > **Empty** and click on the disk icon on the top right corner of the window.



Now click on **Choose a virtual CD/DVD disk file...** and select the downloaded .iso file.



Now click **Open** and the .iso file must have been inserted as a virtual DVD disk to be used for the virtual machine.



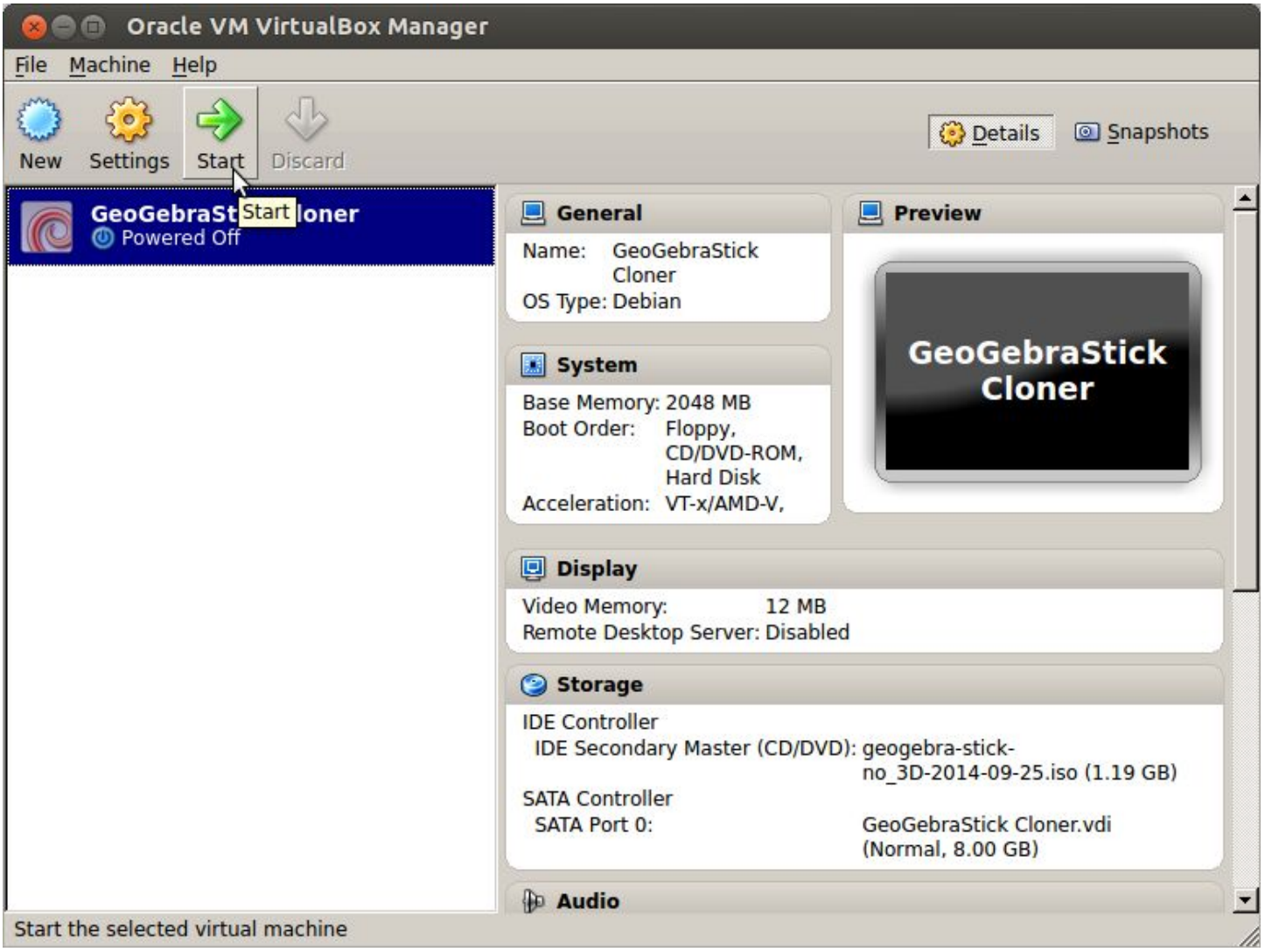
Now click **OK**.

If you use VirtualBox 5 you should enable **System** > **Processor** > **Enable PAE/NX**, otherwise the GeoGebraStick system will not boot properly.

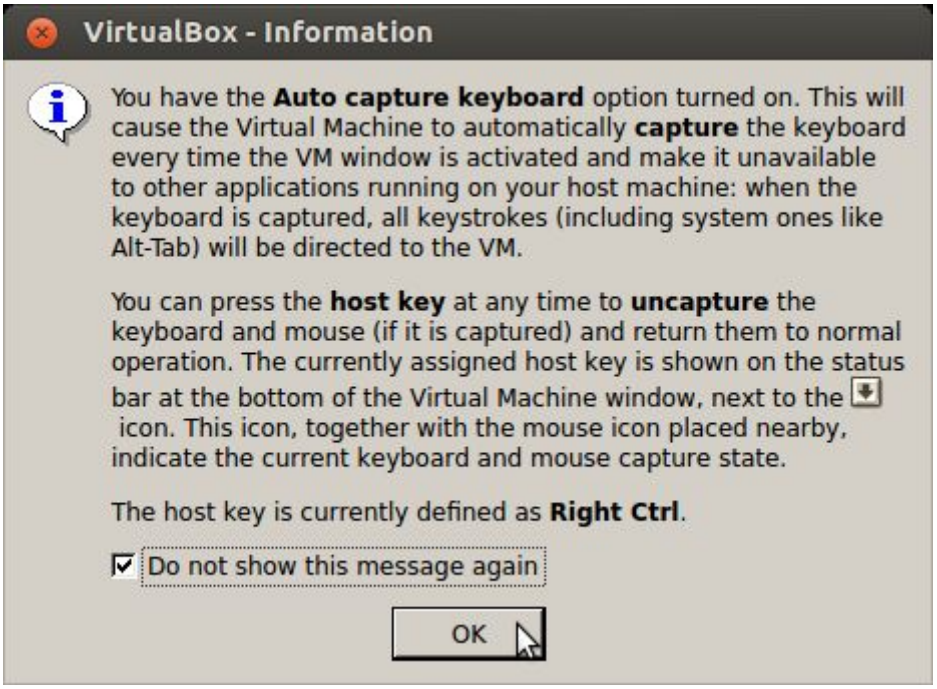
4. Start the operating system...

At this point VirtualBox is ready to start the virtual machine which is able to boot the GeoGebra Stick .iso as a virtual DVD, and then this virtual DVD can be cloned by the automatically started **Storage media management application** (see below).

To start the virtual machine and boot from the virtual DVD, you must press the **Start** button first.

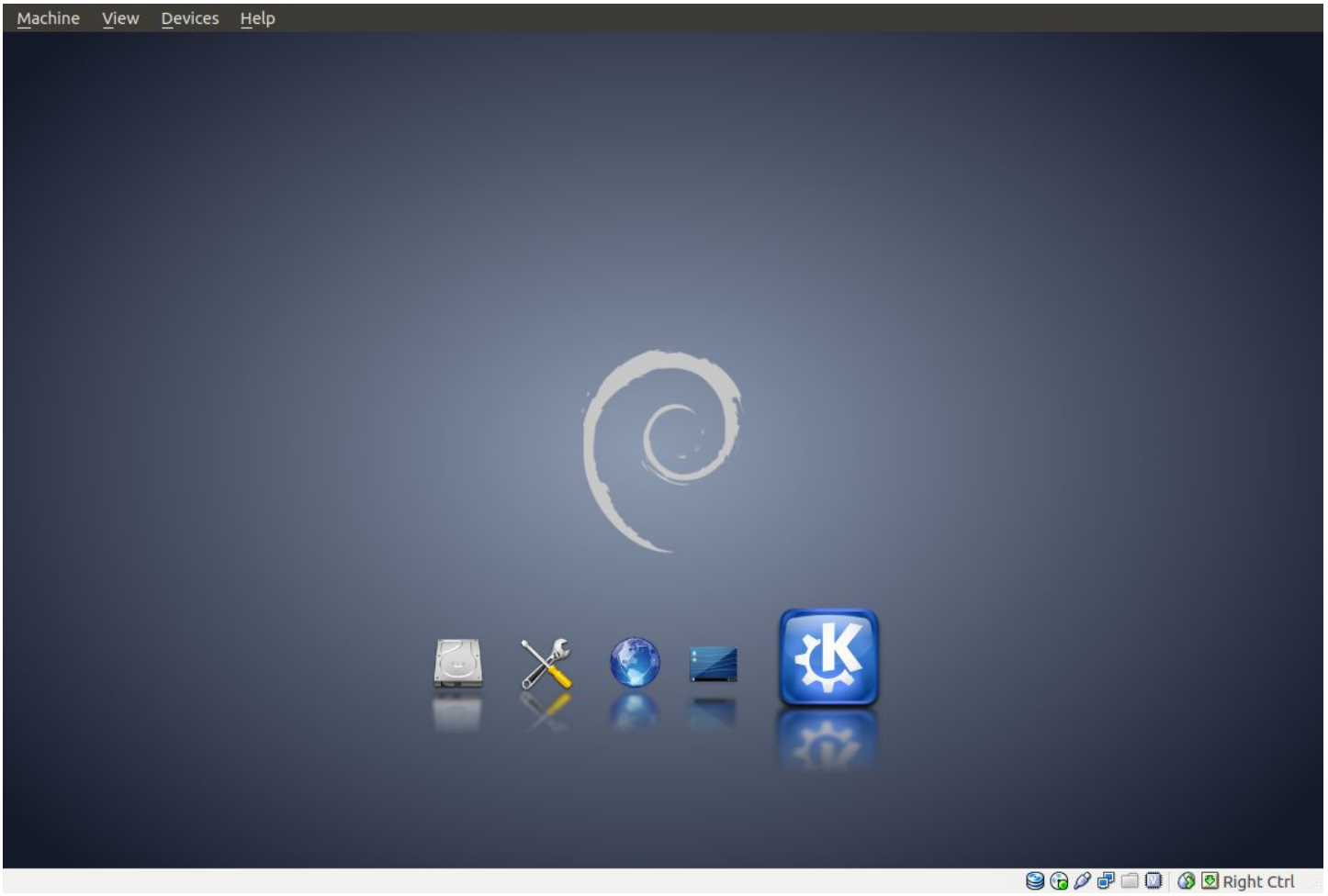


You may safely ignore any information popup window shown by VirtualBox. (There may be multiple information windows about various minor problems. Just click **OK** to ignore them.)

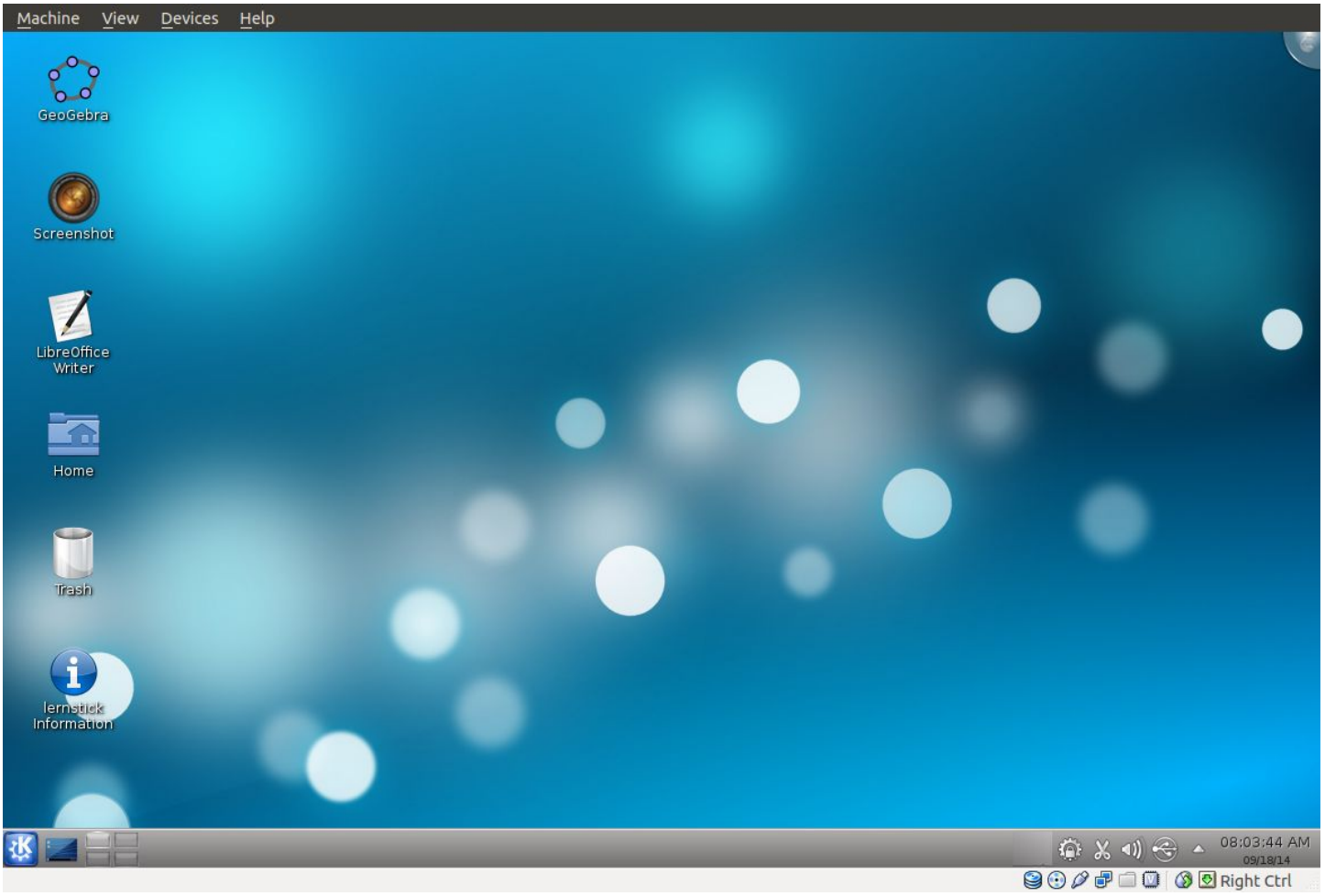


Now GeoGebra Stick starts in a window in VirtualBox. (From now on VirtualBox menus shown on the top of the screenshots are in black background in this tutorial.)

You can select the required country or language right after starting the virtual machine: this will affect the language of the operating system of the stick and also GeoGebra. You can use the arrow keys and the ENTER key. You have 5 seconds to choose. After 30 seconds of any kind of action the currently chosen menu item will be started.



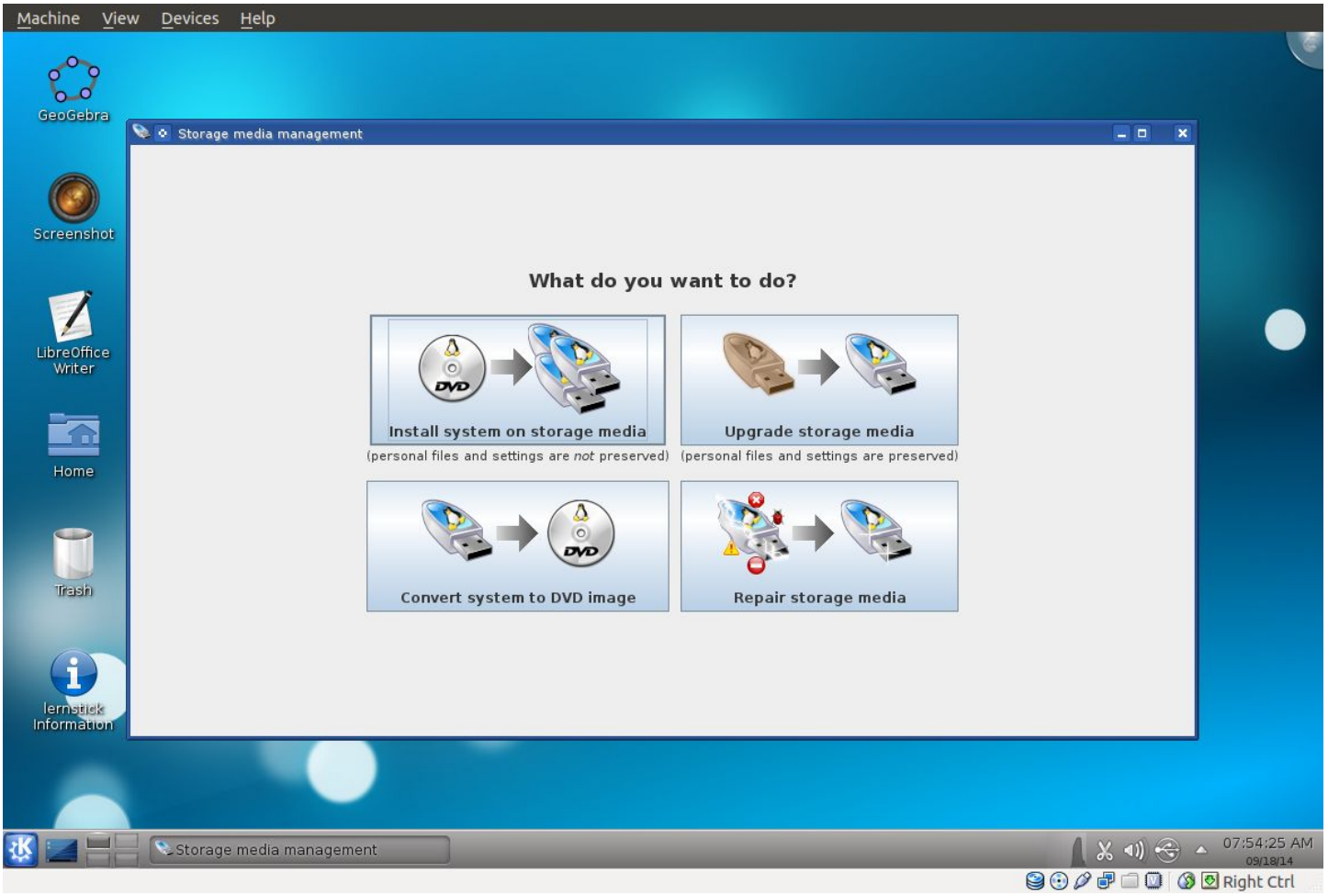
The system startup is shown in 5 steps. Depending on the speed of your computer the startup process takes more or less time. Finally the KDE desktop environment (see icon “K” above) will be shown in full functionality.



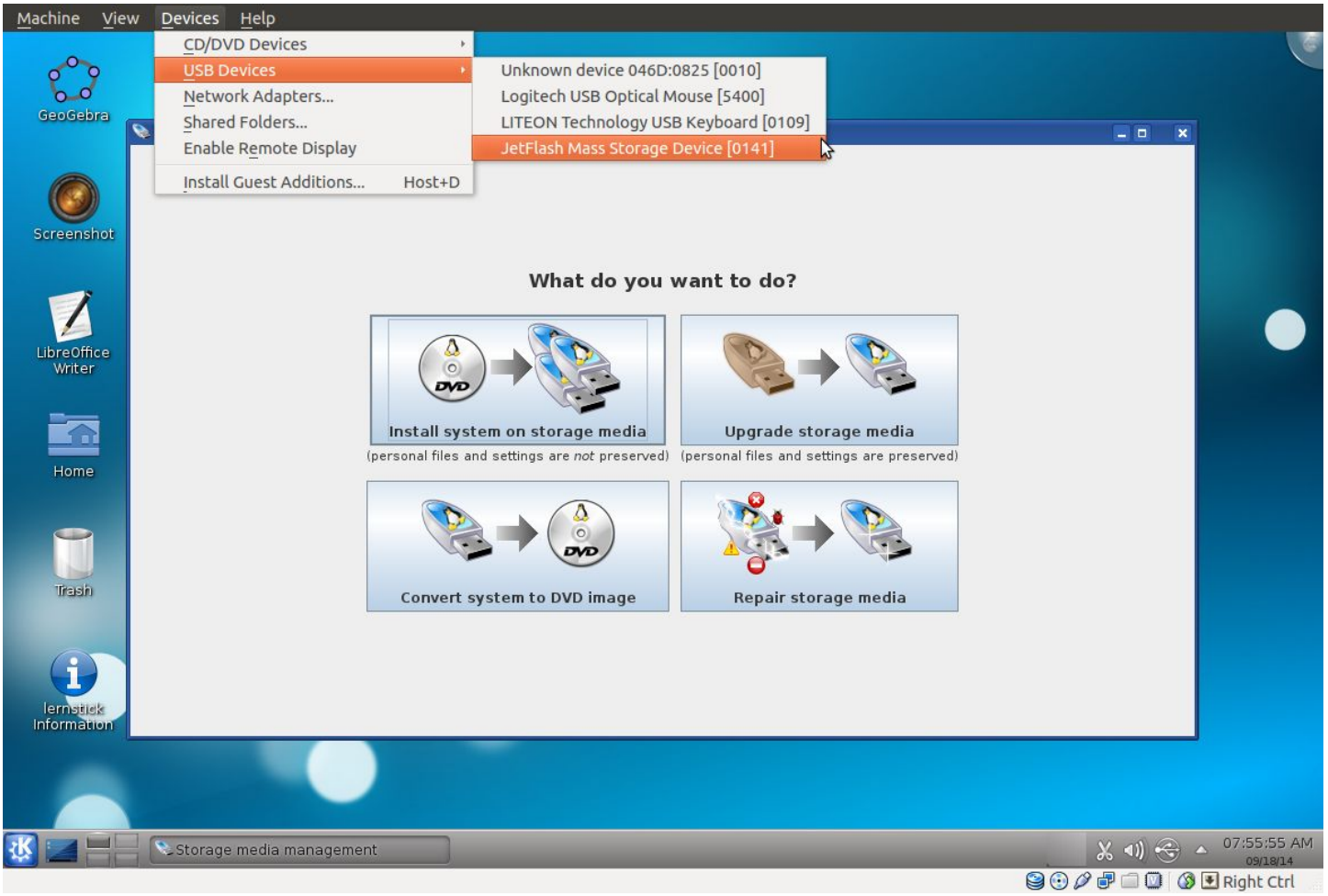
In this documentation an older version of the stick were used to generate screenshots. However, the desktop icons in the latest versions of the GeoGebraStick system will look a bit differently:

5. Clone the operating system...

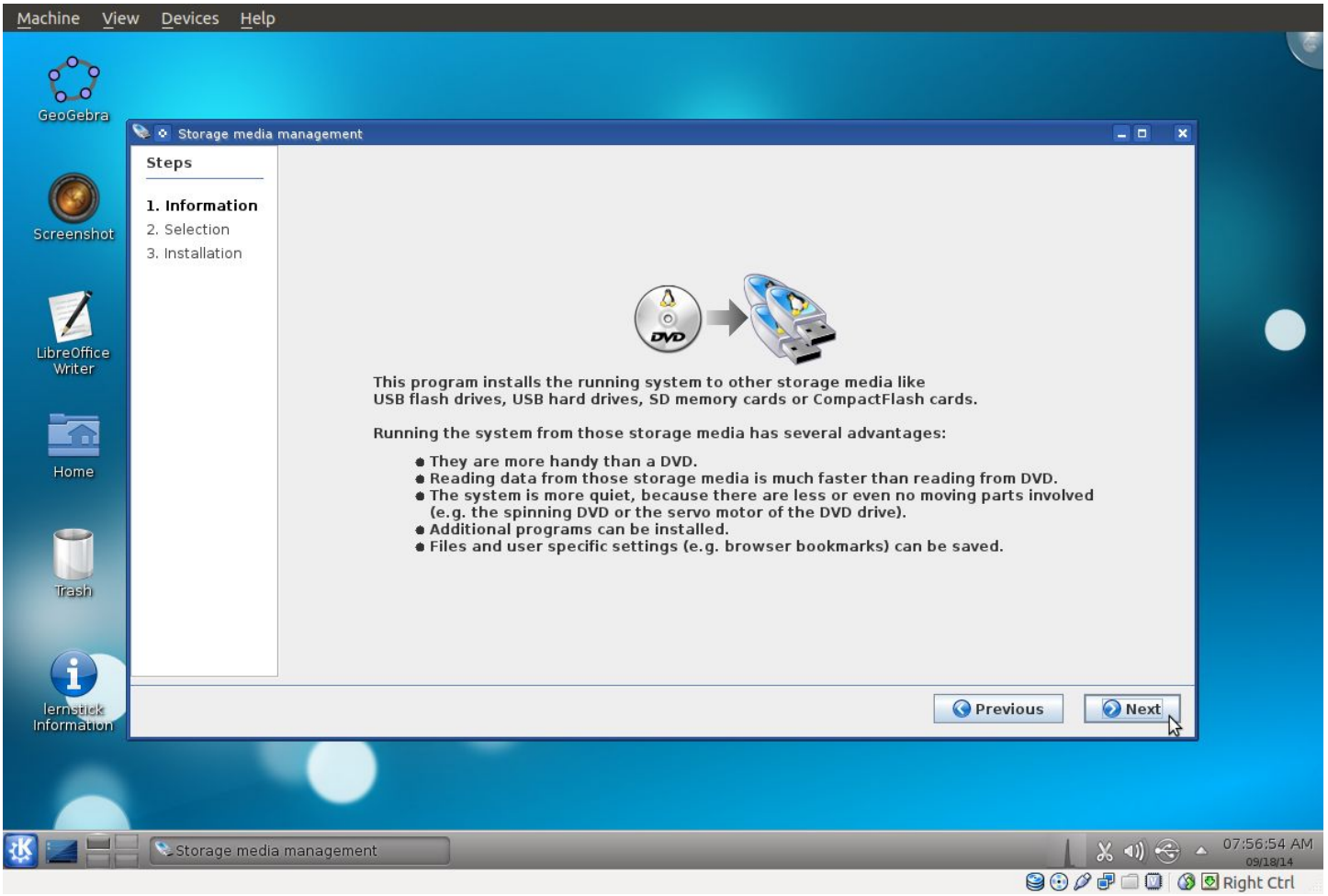
Now automatically the window **Storage media management** will be shown to start cloning GeoGebra Exam Stick to a pendrive.



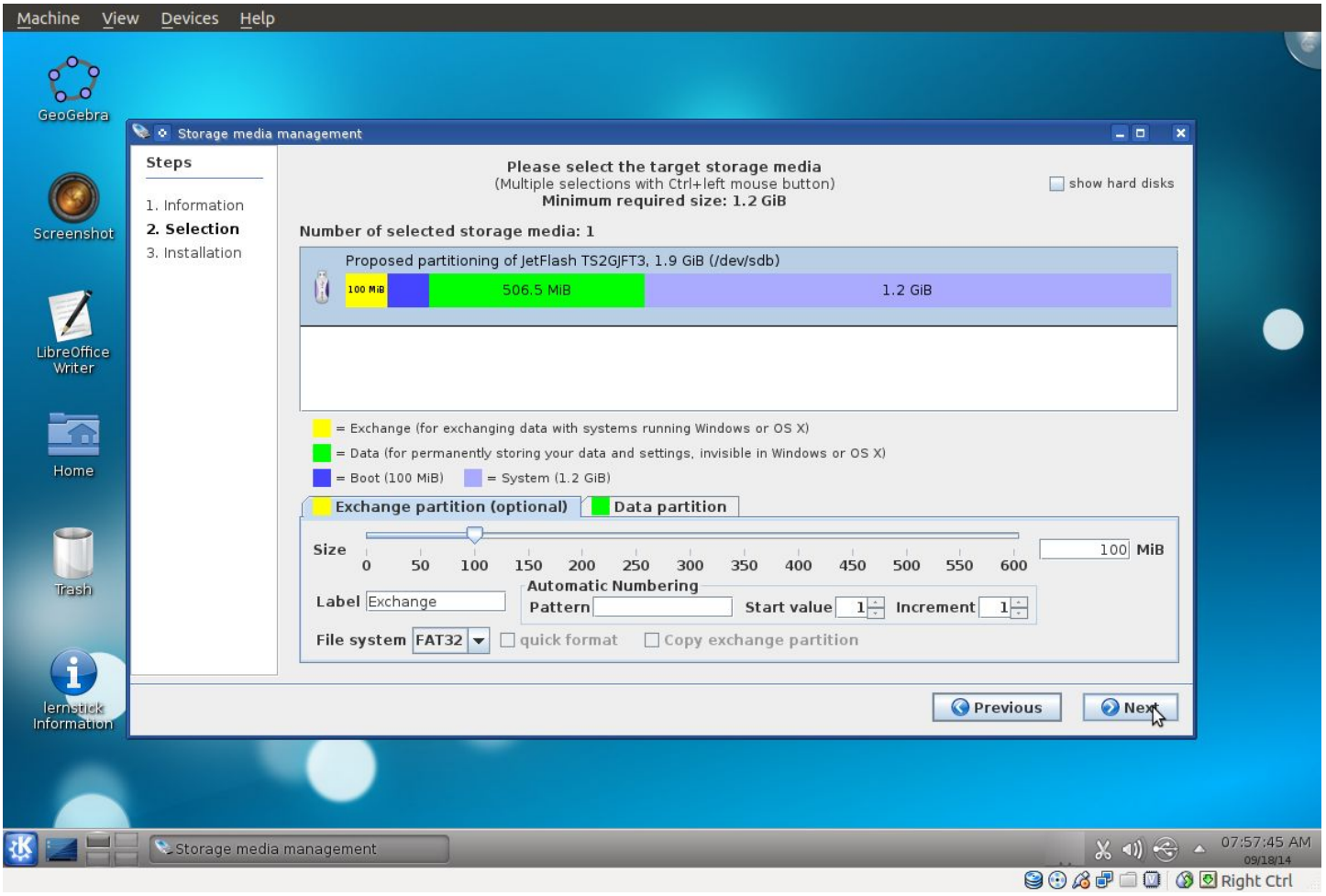
Before continuing, you need to ensure that a pendrive is inserted and it is activated for using with VirtualBox. This can be achieved outside the GeoGebra Exam Stick, in menu **Devices** > **USB Devices**. Each activated device is shown by a checked checkbox before it after clicking by the mouse pointer on the name of the device in the menu list. It is important that you need to unmount the pendrive first in the main operating system you normally use, otherwise it will not be listed in the menu. (For example, under Linux you may need to eject the pendrive if you can see any former content of it in the host operating system.)



Now you may see in the right bottom part of the desktop window the current content of the pendrive for some seconds, then the information text will disappear.
Then click on the button **Install system on storage** media inside the GeoGebra Exam Stick window.



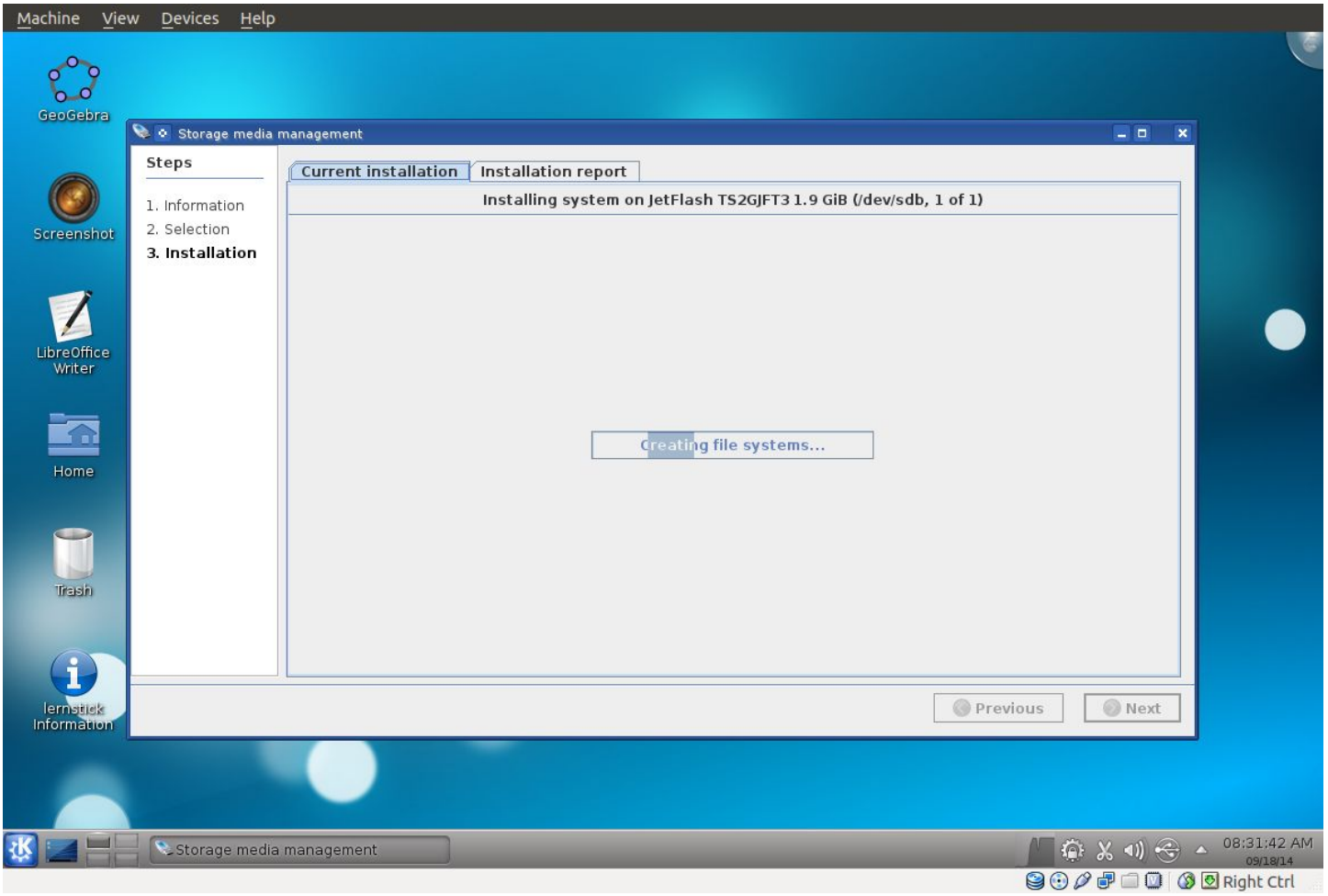
Now click **Next**. If your pendrive is successfully detected by VirtualBox then you should see that step “2. Selection” is activated in the left part of window and a suggested partitioning is also shown.



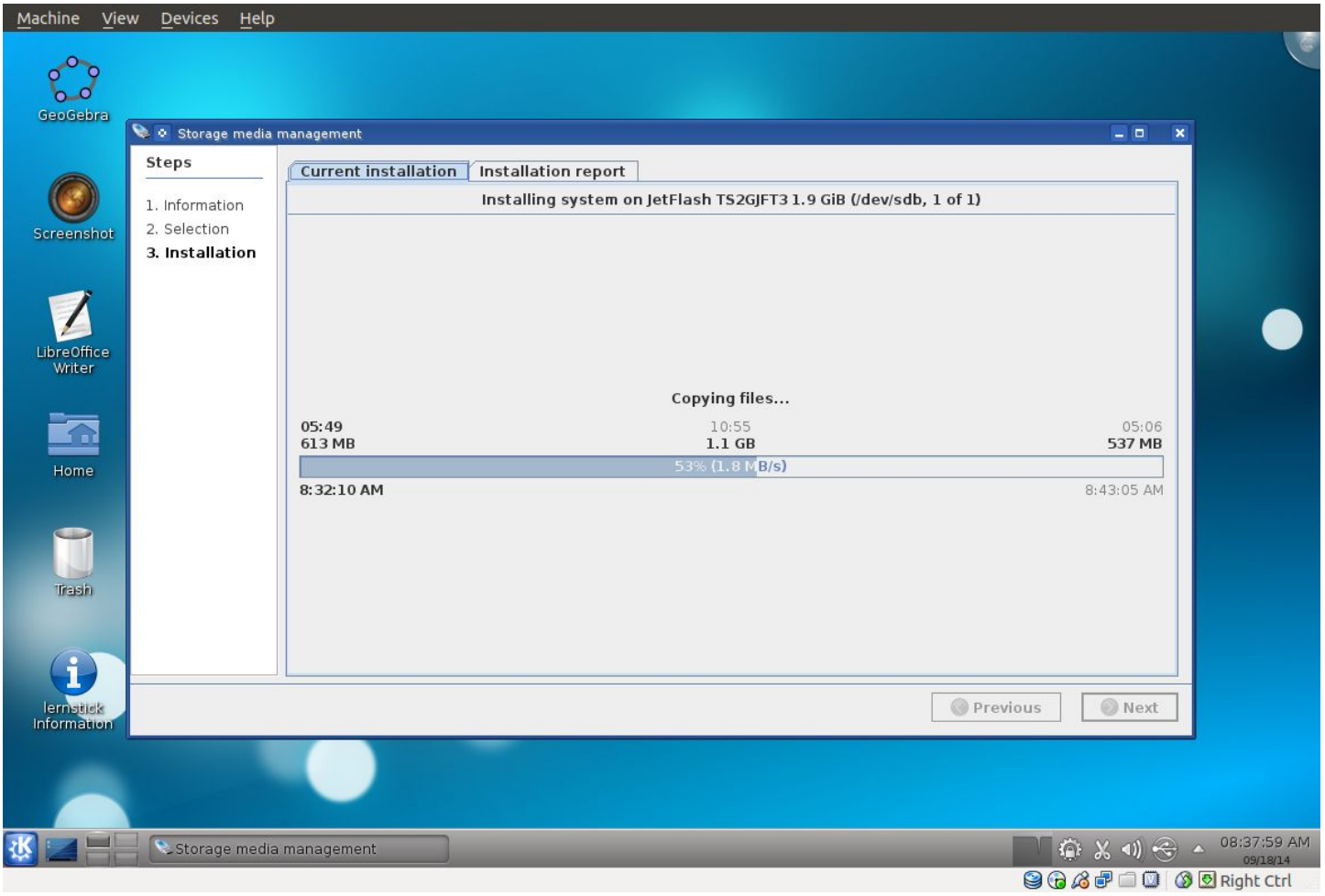
Since you want to save the students’ work automatically to the Exchange partition, you need to set its size to greater than zero. So please move the slider on the bottom and set the size of the Exchange partition to say 100 MiB. (GeoGebra files are usually much smaller. Maybe you want your students to make screenshots about their work, so they will want to use the Screenshot application and also LibreOffice Writer to put the images into a single document. But 100 MiB will still be plenty of storage for most cases.) In the case of using a different language than English, the **Label** of the Exchange partition may differ, this is not a problem, you can choose any label, it is irrelevant.

Now you can click **Next**. You should see a Warning window to confirm deleting the previous content of your pendrive. Click **Yes** to do so.

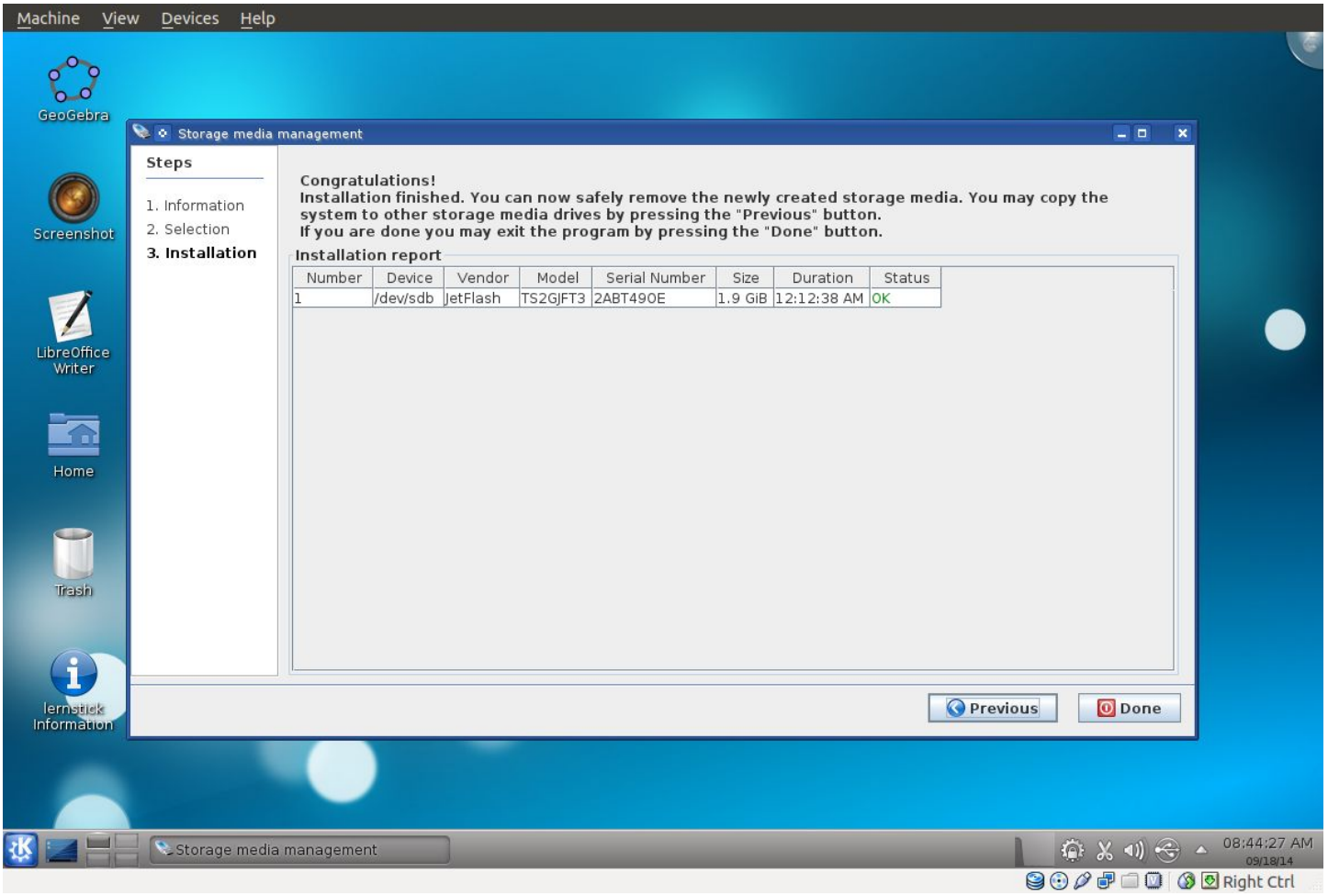
Now the cloning starts and it will take about 10-15 minutes depending on the speed of computer.



The cloning will consist of two parts. First the file systems are created. Then the files are copied from the source media to the target.



When the process finishes another window appears.



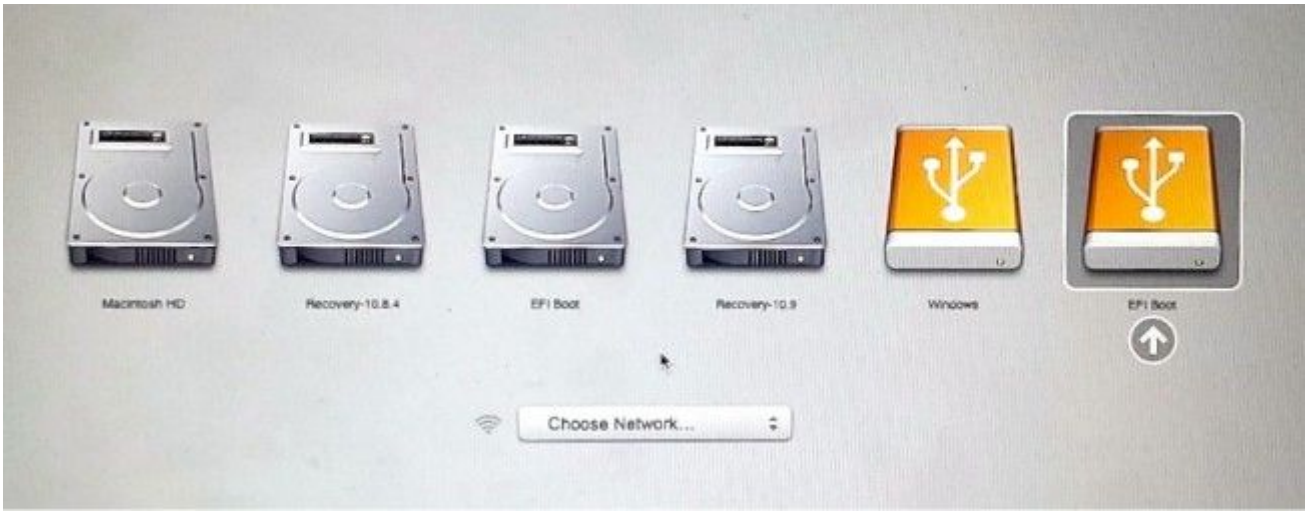
Now you can safely quit GeoGebra Exam Stick via the VirtualBox menu **Machine** > **Quit...** > **Power off the machine** and you are ready to use the pendrive on another machine.
The system on the pendrive is the same as when started in VirtualBox with the following differences:

- There will be no Internet connection. Thus GeoGebra cannot connect to GeoGebraTube.
- The **Storage media management** software will not start.

Use during Exams

2. Boot the pendrive...

- If you use a Mac, hold on the **Option** key (or the **Alt** key if you use a PC keyboard) during switching the machine on and select one of the **EFI Boot** options which appear as last items of the list.



- If you use an *older* PC, take the time to carefully read http://pcsupport.about.com/od/tipstricks/ht/bootusbflash.htm to get help. PCs may have different ways to boot the pendrive, so you may need additional time in finding out how you can enter the boot menu and change the boot order. (There is plenty of Internet resources on this topic.) It is very important to

try out USB booting in advance before the exam for each kind of student laptop. *Note: some very old machines may not support USB booting at all.*

- If you use a *recent* PC (for example a new laptop or netbook), you may need to boot the stick as follows. If you use Windows 8.1, make sure that you insert the stick when you switch your computer on. Then when logged in:
    a. Click on the Start icon on the bottom-left corner.
    b. Swipe in from the right and then tap **Settings**. (If you're using a mouse, point to the upper-right corner of the screen, move the mouse pointer down, and then click Settings.)
    c. Tap or click **Change PC Settings**.
    d. Tap or click **Update and recovery** (which is the last option), and then tap or click **Recovery** (which is the last option, again).
    e. Under **Advanced Startup** (which is the last option, again), tap or click **Restart now**. You may need to wait some seconds here.
    f. On the **Choose an option screen**, tap or click **Use a device**.
    g. You will see at least one option containing the text **UEFI : USB** which should be selected by tapping/clicking to start GeoGebraStick.

Notes for advanced users

- The **Storage media management** application is also available via the **K menu** on the bottom left of the desktop in menu **Applications** > **System** > **lernstick**. Please always use FAT32 for the Exchange **File system** since the default exFAT type is not supported and will not work.